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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,235	12/31/2003	Jerome Maillot	1252.1079	7111

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EXAMINER

BROOME, SAID A

ART UNIT	PAPER NUMBER
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2628

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/748,235	Applicant(s) MAILLOT, JEROME	
	Examiner Said Broome	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 22-36 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-18, 20, 23, 24, 27 and 30-36 is/are allowed.
- 6) ☒ Claim(s) 19, 22, 25, 26, 28 and 29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This office action is in response to an amendment filed 11/26/2006.
2. Claim 21 has been cancelled by the applicant.
3. Claims 18-20, 22-31, 35 and 36 have been amended by the applicant.
4. Claims 1-17 and 32-34 are original.

Allowable Subject Matter

Claims 1-18, 20, 23, 24, 27 and 30-36 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claims 1, 18, 24, 35 and 36. Yamrom teaches finding an intersection with a mesh object in column 1 lines 46-48. Glassner illustrates finding an intersection with the surface of a three dimensional object in Figure 2. Glassner also teaches determining an intersection by using an outer bounding surface on page 61 second column fourth paragraph lines 1-5, a tight inner surface that is both bounded by the outer bounding surface and wraps the original surface of the three dimensional object in Figure 3. However, none of the prior art teaches or suggests a first tessellation linking the tight inner surface to the original mesh surface and a second tessellation linking the bounding surface to the tight inner surface.

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claim 20. Yamrom teaches finding an intersection

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with a mesh object in column 1 lines 46-48. Glassner illustrates finding an intersection with the surface of a three dimensional object in Figure 2. Glassner also teaches determining an intersection by using an outer bounding surface on page 61 second column fourth paragraph lines 1-5, a tight inner surface that is both bounded by the outer bounding surface and wraps the original surface of the three dimensional object in Figure 3. However, none of the prior art teaches or suggests finding of the intersection with the original mesh surface is performed according to an intersection with the outer bounding surface, and wherein the tight inner surface comprises a convex hull, wherein there is a first tessellation between and linking the convex hull with the outer bounding surface, and wherein the finding further comprises traversing a path from the intersection with the outer bounding surface through the second tessellation to an intersection with the convex hull surface, and traversing from the intersection with the convex hull surface through the first tessellation to thereby find the intersection with the original mesh surface; and one of displaying the intersection on a display and storing the intersection in a storage.

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claim 23. Yamrom teaches determining an intersection with the surface of a mesh model in column 1 lines 46-48. Glassner illustrates finding an intersection with the surface of a three dimensional object in Figure 2, and also teaches determining an intersection by using an outer bounding surface on page 61 second column fourth paragraph lines 1-5, a tightly constrained surface that is both bounded by the outer bounding surface and bounds the original surface of the three dimensional object in Figure 3. However, none of the prior art teaches or suggests using the polyhedrons or polygons

tessellation to automatically determine an intersection order or rank of one or more intersections between a line and the mesh model.

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claim 27. Yamrom teaches determining an intersection with the surface of a mesh model in column 1 lines 46-48. Glassner illustrates finding an intersection with the surface of a three dimensional object in Figure 2, and also teaches determining an intersection by using an outer bounding surface on page 61 second column fourth paragraph lines 1-5, a tightly constrained surface that is both bounded by the outer bounding surface and bounds the original surface of the three dimensional object in Figure 3. However, none of the prior art teaches or suggests finding a second intersection between the ray and the mesh object based on the moving of the ray or the mesh object; and after the finding, determining whether the second intersection is occluded along the ray by the mesh object using a tessellation constrained to the mesh model; and one of displaying the intersection on a display and storing the intersection in a storage.

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claim 30. Yamrom teaches determining an intersection with the surface of a mesh model in column 1 lines 46-48. Glassner illustrates finding an intersection with the surface of a three dimensional object in Figure 2, and also teaches determining an intersection by using an outer bounding surface on page 61 second column fourth paragraph lines 1-5, a tightly constrained surface that is both bounded by the outer bounding surface and bounds the original surface of the three dimensional object in Figure 3. However, none of the prior art teaches or suggests finding a second intersection between the

ray and the mesh object based on the moving of the ray or the mesh object; and after the finding, determining whether the second intersection is occluded along the ray by the mesh object; finding a third intersection that occludes along the ray, and wherein the third intersection is found by traversing polygons or polyhedrons of a tessellation constrained to the mesh model; and one of displaying the intersection on a display and storing the intersection in a storage.

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claim 31. Yamrom teaches finding an intersection of a ray with an original mesh surface in column 1 lines 46-48. Glassner teaches determining an intersection by using an outer bounding surface of a mesh object on page 61 second column fourth paragraph lines 1-5, and a tight inner surface that is both bounded by the outer bounding surface and wraps the original surface of the three dimensional object in Figure 3. However, none of the prior art teaches or suggests a detecting movements of the ray or the object, one relative to the other, and for some of the movements: when the ray intersects the mesh object at a local neighbor of a face of the mesh object, determining whether intersection of the ray with the mesh object is occluded by the mesh object by traversing polygons not part of the mesh object; and when the ray does not intersect the mesh object at a local neighbor of a face of the mesh object, finding an intersection of the ray with the mesh object by traversing polygons intersected by the ray, where the polygons are not part of the mesh object and include at least one polygon of a bounding surface bounding the mesh object; and one of displaying the moved intersection on a display and storing the moved intersection in a storage, as recited in claim 31.

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claim 32. Yamrom teaches finding an intersection

with an original mesh surface between a ray and the mesh surface in column 1 lines 46-48. Glassner teaches finding an intersection with the surface of a three-dimensional object, as illustrated in Figure 2. Glassner also teaches determining an intersection by using an outer bounding surface on page 61 second column fourth paragraph lines 1-5, and a convex hull or tight inner surface that is both bounded by the outer bounding surface and wraps the original surface of the three dimensional object, as shown in Figure 3. However, none of the prior art teaches or suggests a bounding mesh bounding the original surface mesh and with low resolution relative to the original mesh surface, and a mesh of polyhedrons constrained to the original mesh surface and constrained to the original mesh, where polyhedrons with shared faces generally decrease in size in the direction of the original mesh surface, as recited in claim 32.

The prior art, Yamrom (US Patent 6,249,287) and Glassner ("*Spacetime Ray Tracing for Animation*"), do not teach the limitations of claim 34. Yamrom teaches finding an intersection with an original mesh surface between a ray and the mesh surface in column 1 lines 46-48. Glassner teaches finding an intersection with the surface of a three-dimensional object, as illustrated in Figure 2. Glassner also teaches determining an intersection by using an outer bounding surface on page 61 second column fourth paragraph lines 1-5, and a convex hull or tight inner surface that is both bounded by the outer bounding surface and wraps the original surface of the three dimensional object, as shown in Figure 3. Glassner also teaches traversing adjacent intersected polygons or polyhedrons, as illustrated in Figure 3, starting from a first intersection until an intersection is found on pg. 61 left column 6th paragraph lines 2-6 – right column 1st paragraph lines 1-2. However, none of the prior art teaches or suggests a first

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tessellation linking the convex hull to the original mesh surface, and a second tessellation linking the bounding surface to the convex hull, where the second tessellation tessellates a space between the bounding surface and the convex hull surface, and where the first tessellation tessellates a space between the convex hull surface and the original surface mesh, as recited in claim 34.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 19, 22, 25, 26, 28 and 29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 19, 22, 25, 26, 28 and 29 recite various methods, however no tangible result is produced. Therefore, the claimed invention does not possess "real world" value. The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409

U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had “no substantial practical application.”).

Response to Arguments

Applicant's arguments filed 11/26/2006 have been fully considered but they are not persuasive.

The applicant argues the objection to claims 19, 22, 25, 26, 28 and 29 stating that the claims fail to further limit the subject matter of a previous claim. However, in view of the amendments to claims 19, 22, 25, 26, 28 and 29, the arguments are persuasive and the claim objections have been withdrawn. The applicant also argues the 35 U.S.C. 101 rejection of claims 18, 20, 23, 24, 27, 30, 31, 35 and 36. The applicant's arguments are persuasive and the examiner withdraws the rejection due to the amendment to claims 18, 20, 23, 24, 27, 30, 31, 35 and 36, which now provide a tangible result, and are therefore statutory. The applicant also argues that the claim objections, with regards to claims 18, 27, 35 and 36 as being a substantial duplicate of claim 20, are unreasonable. The argument with regards to claims 18, 27, 35 and 36 is persuasive and the objection has been withdrawn.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after


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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S. Broome
2/16/07 


ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER